R E P O R T R E S U M E S

ED 013 475 CG 000 932

SCHOOL ANXIETY AND THE FACILITATION OF PERFORMANCE.

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PUB DATE 67

EDRS PRICE MF-$0.25 HC-$1.00 25P.

DESCRIPTORS- *ANXIETY, *ELEMENTARY SCHOOL STUDENTS, *PERFORMANCE, CLUSTER GROUPING, *QUESTIONNAIRES, STATISTICAL ANALYSIS, CREATIVITY, STANFORD BINET INTELLIGENCE TEST, PEARSONS PRODUCT MOMENT CORRELATIONS

THE RELATIONSHIPS BETWEEN SCHOOL GENERATED ANXIETY AND VARIOUS INDICES OF SCHOOL ACHIEVEMENT, CREATIVITY, AGE, AND IQ, ARE INVESTIGATED. A 160 ITEM, MULTIPLE-CHOICE, MULTI-SCALE, SCHOOL ANXIETY QUESTIONNAIRE WAS ADMINISTERED TO 56 FOURTH, FIFTH, AND SIXTH GRADE CHILDREN WITH A MEAN STANFORD BINET IQ OF 126 FROM AN UPPER MIDDLE CLASS COMMUNITY. FACTOR SUBSCALE T-SCORES RULED OUT THE EFFECTS OF RESPONSE BIAS, AND CLUSTER ANALYSIS IDENTIFIED SUBGROUPS OF INDIVIDUALS WITH SIMILAR PATTERNS OF RESPONSE ACROSS VARIABLES. SIGNIFICANT POSITIVE RELATIONSHIPS WERE FOUND BETWEEN A SPECIFIC MEASURE OF CHILDREN'S SCHOOL ANXIETY AND SCHOOL PERFORMANCE. THE QUESTIONNAIRE MEASURE OF ANXIETY WAS A SIGNIFICANT PREDICTOR OF SCHOOL ACHIEVEMENT. RESULTS ARE DISCUSSED IN TERMS OF ANXIETY ABOUT TEST ANTICIPATION, TEACHER REPORTS, SCHOOL FAILURE, AND GOOD SCHOOL PERFORMANCE. THE RESULTS OF THE STUDY SUGGEST THAT AT LEAST IN THE LATER ELEMENTARY GRADES AND ESPECIALLY FOR GIRLS, NEGATIVE AFFECT CAN HAVE A FACILITATING EFFECT ON SCHOOL PERFORMANCE. THIS DOCUMENT APPEARED AS STUDY 8 IN SCHOOL ANXIETY AND COGNITIVE FUNCTIONING/ EXPLORATORY STUDIES, REPORT 4, IRCOPPS MIDWEST RESEARCH CENTER FOR PUPIL PERSONNEL SERVICES, ANN ARBOR, MICHIGAN, PP. 223-241. (PS)

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SCHOOL ANXIETY AND COGNITIVE FUNCTIONING: EXPLORATORY STUDIES

University of Michigan

CG 000 932

Report 4

IRCOPPS MIDWEST RESEARCH CENTER
FOR PUPIL PERSONNEL SERVICES

SCHOOL ANXIETY AND COGNITIVE FUNCTIONING: EXPLORATORY STUDIES

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THE UNIVERSITY OF MICHIGAN
1967

MIDWEST RESEARCH CENTER FOR PUPIL PERSONNEL SERVICE

July 1967

PREFACE

This report is the fourth in a series of research monographs published by the IRCOPPS Midwest Research Center. A survey of Center activities plus a comprehensive synopsis of the Center's project reports may be found in the Center's 1967 Summary Status Report.

The present monograph reports the results of eight modular pilot studies conducted by various center staff. All research was supported by NIMH Grant #01428. Several of the studies have been presented, in abbreviated form, at various professional meetings and certain of the results have already appeared, or are due to appear, as short published articles.

Appreciation is expressed to the various staff associated with the production of these reports.

James A. Dunn
Director
IRCOPPS
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TABLE OF CONTENTS

STUDY VIII

SCHOOL ANXIETY AND THE FACILITATION OF PERFORMANCE

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TABLE OF CONTENTS

The systematic study of anxiety in children has flourished in the last decade, chiefly due to the development of questionnaires designed to tap either children's "general" anxiety (Taylor, 1953) or the more specific, cue-oriented affects, such as "test anxiety" (Sarason, Davidson, Lighthall, Waite, & Ruebush, 1960), for example. Recently, however, there has been a noticeable decrease in questionnaire anxiety research. Methodological problems--such as "response set", "social desirability" (Edwards, 1953), and "defensiveness" (Sarason, 1966)--have become well-known and have contributed to the decreased use of simple questionnaire results. Sarason (1966) suggests that anxiety scales, in their present format, may have already contributed most of their usefulness and that in the future these instruments may be expected to contribute "less and less to our understanding of anxiety and defense."

Most of the past research on children's school anxiety and its relation to achievement has rested on two theoretical foundations: learning theory and psychoanalytic theory. More recently, a multivariate approach to the theory of

motivation has been applied to the investigation of the effects of anxiety on academic achievement (Atkinson, 1964). In this latter approach, attention has been paid to the situational context in which the behavior is embedded and to the expectancies and values of the individuals reacting in specific situations.

The rationale of the current study is that anxiety is an acquired affect state which is, in general, situation-specific. The model assumes that a child's anxiety in school is, in part, a function of his learned potential for experiencing negative affect in a specific school situation and of the presence or absence of a situationally specific type of stress condition. The model predicts a maximal relationship between anxiety and performance when both type of stress and type of behavior parallel the type of anxiety potential.

The intent of the present study was to investigate the relationships between school-generated anxiety and various indices of school achievement, creativity, age, and IQ--using a statistical approach which corrects for individual differences in response style.

METHOD

Subjects and Procedures

A 160-item multiple-choice, multi-scale school anxiety questionnaire, developed over the course of a series of pilot studies, was administered to 56 fourth, fifth, and sixth grade children from an upper middle class community which stresses high academic achievement. There was an approximately equal distribution of sex. Most of the children had received all their elementary education in the same school, whose educational practices minimize the effects of test grades and report cards, although both ungraded "tests" and teacher interviews with parents are part of the regular school procedure.

The mean Stanford-Binet IQ of these children was 126; the standard deviation was 19. Analyses of variance indicated that there was no significant difference in IQ between boys and girls, nor was there a significant difference in IQ among grades.

Two alternate forms of the school anxiety questionnaire were administered at equal intervals; in all cases, standardized procedures were followed, and each class was attended by both male and female examiners. The children's responses, recorded on IBM answer sheets, were based on a five-point scale, ranging from "almost always" to "almost never."

Statistical Analyses and Results

Two innovative statistical methods were used; one involved a method developed by Bergan (1966) in order to obtain factor subscale t-scores which rule out the effects of response bias and the other involved a "cluster analysis" technique developed by Johnson (1966) in order to identify subgroups of individuals with similar patterns of response, across variables, through utilization of a computer "search."

Varimax factor analysis identified four factors, accounting for 48% of the common variance. These were tentatively identified as follows:

Factor I - Anxiety regarding Test Anticipation

Factor II - Anxiety regarding Teacher Reports to Parents

Factor III - Anxiety regarding School Failure

Factor IV - Anxiety regarding Good School Performance

A fifth scale, a buffer scale composed of a set of heterogenous school anxiety items, was used to adjust the means and standard deviations of the other four subscales in order to remove bias. In short, the Bergan scoring procedure computes t-scores "within individuals," rather than "across individuals."

Split half correlations were obtained for Factors I, II, and IV (Factor III was not large enough to permit such correlation). These "half-test" estimates of factor subscale reliability were .92, .82, and .81 respectively. Full length factor subscale reliabilities were then estimated according to a special form of the Spearman-Brown formula proposed by Guilford (1965, p.457):

$$r_{tt} = \frac{2r_{hh}}{1 + r_{hh}}$$

where r_{hh} stands for the correlation between odd-even halves of a test. The full factor subscale estimates of reliability were thus found to be .96, .90, and .90 for Factors I, II, and IV, respectively. (In a replication study, these estimates of reliability were found to be .96, .90, and .95 for Factors I, II, and IV.)

The four factor subscale scores were then correlated (by means of Pearson product-moment r's) with such variables as age, IQ, and grade level, as well as with standardized measures of achievement and of creativity (See Table 1). Since the method of obtaining the factor subscale scores permits the criterion of independence to be met for only one of the four factor scores, it was necessary to choose the most meaningful set of correlations for further analysis. This was done on a post hoc basis, and Factor IV was chosen. (Although considerations of independence preclude placing too much emphasis on an examination of other factor subscales, it is interesting to note that high significant negative correlations were found between another subscale--Anxiety regarding School Failure--and most of the achievement variables.) The factor under present consideration was found to have high positive correlations with all variables (See Table 1).

Because the global approach of the correlation matrix might be expected to mask the more subtle relationships within the group, several methods were employed to investigate intra-group

effects. These included two analyses of covariance (since IQ was found to correlate significantly with Achievement Anxiety), the generation of two series of stepwise multiple regression equations, and the examination of the aforementioned "cluster analysis."

The analyses of covariance were both significant, with girls responding more readily to Achievement Anxiety ($p < .05$) than boys; and with responsivity on this factor increasing directly with age ($p < .01$). (See Tables 2-A; 2-B)

The two sets of stepwise multiple regression equations give quantitatively different results, depending on which achievement measures were chosen for prediction; however the results were qualitatively similar. Since Achievement Anxiety had been seen to be affected by increasing grade level, it was decided to investigate the Factor's ability to predict achievement scores of two kinds: an absolute achievement score (California Achievement Test, Mean Academic Achievement Grade) and the same score with the effect of age partialed out (CAT Mean Academic Achievement Grade/CA). In both cases, the entering variables were the same: all questionnaire anxiety factor subscale scores and two measures of IQ (WISC Vocabulary Scale Score; Stanford-Binet). Where absolute achievement was the criterion, the Achievement Anxiety Factor was the first entering variable, accounting for 41% of the variance. It was followed by the two IQ scores, which accounted for another 10.8%

of the variance (See Table 3-A). Where an achievement quotient was the criterion, however, the Stanford-Binet IQ was the first entering variable, accounting for 53% of the variance--with Achievement Anxiety as the only other significant "predictor" ($p < .05$) adding another 6% of the variance (See Table 3-B). (Variables not entered on the tables were not significant at the .05 level of confidence.)

After the broader relationships had been studied, the five subscales, the two measures of intelligence, and the measure of absolute academic achievement were "patterned and searched" to describe individual response patterns. "Coefficients of similarity" were generated among the individuals' patterns of response, to be utilized in the computer program, as a basis for locating clusters of individuals with similar response patterns. Analyses of variance and a procedure whereby orthogonal t-tests are executed were then performed, in order to discover significant areas of variability among the newly-formed clusters of individuals. Because the sample was small, only the two most variant groups will be reported (See Table 4).

The largest of the subgroups (N=27) showed the highest achievement (measured as positive deviation from the sample

mean); this cluster of individuals was contrasted with the group which showed the lowest achievement (highest negative deviation from the sample mean). The two groups accounted for 57% of the sample. When these two groups were examined for their reaction to Achievement Anxiety, it was found that no other subsample scored higher than the "high achievers" or lower than the "low achievers" on this factor (t-scores between the two groups for both Achievement Anxiety and Achievement show these differences to be significant at the .001 level of confidence).

Thus, the cluster analysis bore out the impression that the high positive correlation between Achievement Anxiety and Achievement was not due to the extreme deviance of a few individuals in the sample.

DISCUSSION

High significant positive relationships were thus found between a specific measure of children's school anxiety and children's school performance--whether traditional measures of achievement or whether less traditional measures of creativity were used as criteria for school performance. Although the questionnaire measure of "Achievement Anxiety" correlated significantly and positively with both age and IQ, statistical measures designed to partial out these effects

have indicated that this factor subscale is a significant predictor of school achievement, in its own right.

The size of the Pearson product-moment correlations suggests that increased questionnaire validity has been attained both through improvement in instrument design and in the method of scoring. Correction of scores for individual differences in response style increases the sensitivity of the instrument by ruling out an important source of error. In addition, the rationale underlying the construction of the instrument under discussion has reduced a second source of error: the affect measure has a high degree of situational specificity, which is useful when specific performance measures are to be considered in the affect-performance interaction (for example, when school anxiety is being correlated with school performance).

In an a priori attempt to appraise the four factor subscales of the questionnaire, Factor I was clearly identifiable as involving Test Anticipation. (Typical of the items were such questions as: How much does it bother you when the teacher says she will give the class a test to do?) Although this factor accounted for twice as much of the common variance as the next three factors, Test

Anticipation did not seem to be an important factor in the prediction of achievement for this population. (This observation supports the impression of the teachers and of the director of the school who state that there is a conscious effort to minimize the effects of test feedback and and who feel that testing is "unimportant" in this school.)

The relative importance and the underlying homogeneity of the items within the other three factor subscales was more difficult to assess. (All three subscales accounted for approximately equal percentages of the common variance.) The second factor was identified by its highest loading items, most of which referred to the teachers' reports to the parents (for example: How nervous do you get when you think of the teacher's report of your work?). This factor, too, seemed to have little predictive ability in this study.

Factor III was heavily weighted with cues evoking a child's negative evaluation of his prospects for success in school (for example: How often do you worry that you might fail? How much does it bother you when someone brags about his grades and then asks to see yours?). It is conceivable that in a less well-endowed school population, this might be the independent factor most suitable for study.

Factor IV -- the group of items whose scores seemed to have the highest degree of significance for this population -- was particularly impressive because of the high positive correlations with all of the achievement measures considered. Thus this factor suggests an area of specific school stressors whose interaction with performance may have a facilitating effect for those children who are receptive to such cues. The items cover a wider range of stressful situations than do those items in the other subscales, and since the empirical results of the various statistical procedures indicated a clear association with achievement, it was decided to call this factor "Achievement Anxiety." Examination of the various items in this subscale shows that many of them are concerned with the interruption of goal-directed activity (for example: How much does it bother you when the teacher collects your paper and you haven't finished?). Furthermore, in all the items, the anxiety is attuned to immediate and clear-cut external cues, whether these involve social reinforcement (How much does it bother you when you think someone deliberately hurt your feelings?) or whether they involve task feedback (How much does it bother you when you get bad grades on your schoolwork?). Thus, it seems that

timing and precision are important attributes of those stressors which may facilitate school performance.

The results of this study suggest that, at least in the later elementary grades and especially for girls, negative affect can have a facilitating effect on school performance -- particularly when the children have a high expectation of success and when the situational cues are immediate, external, relevant, and precise. Further application of the rationale inherent in the development of a situation-specific anxiety questionnaire, together with the described method of obtaining standardized subscale scores, can be expected to obtain further evidence of the effects of anxiety on achievement in populations whose customary environmental cues differ from those in the present study.

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APPENDIX

TABLES

TABLE 1

Pearson Product-Moment Correlations:
Questionnaire Factors Correlated with Age, IQ, Achievement, School Grade, & Creativity

Variables / Factors	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
I	.06	.23	.16	.16	.11	.13	.17	.14	.12	.12	.11	.11	-.08	-.02	-.02
II	-.13	-.12	-.17	-.21	-.15	-.23	-.22	-.25	-.09	-.15	-.11	-.05	-.06	-.08	-.05
III	.06	-.53**	-.34**	-.26*	-.34**	-.32*	-.33*	.02	-.37**	-.42**	-.45**	-.46**	-.34*	-.26	-.34*
IV	.35**	.37**	.56**	.56**	.54**	.64**	.62**	.39**	.38**	.40**	.47**	.46**	.56**	.42*	.50**

* Significant at the .05 level of confidence
** Significant at the .01 level of confidence

Column / Variable

1. Age
2. IQ (Stanford-Binet; Form L-M)
3. Reading Grade (California Achievement Test)
4. Arithmetic Grade (California Achievement Test)
5. Spelling Grade (California Achievement Test)
6. Language Grade (California Achievement Test)
7. Mean Academic Achievement Grade (California Achievement Test)
8. School Grade
9. Reading Quotient (Reading Grade/Chronological Age)
10. Arithmetic Quotient (Arithmetic Grade/Chronological Age)
11. Mean School Achievement Grade (Mean Academic Achievement Grade/Chronological Age)
12. Mean School Achievement Placement (C.A.T. Mean Grade Placement/Grade Placement)
13. Ideational Fluency (Torrance Tests of Creative Thinking: Grades 4 & 6 only)
14. Spontaneous Flexibility (Torrance Tests of Creative Thinking: Grades 4 & 6 only)
15. Originality (Torrance Tests of Creative Thinking: Grades 4 & 6 only)

TABLE 2-A

Analysis of Covariance: School Achievement Factor
Scores with IQ (Stanford-Binet) Held Constant
Source of Variation: Sex

Source of Variation	df	Adjusted SS	MS	F Ratio	Group	Mean	Adjusted Mean
Between groups	1	47.70	47.70	4.51*	Boys	54.32	54.30
Within groups	53	560.92	10.58		Girls	56.14	56.15
Total	54	608.63					

* ($p < .05$)

TABLE 2-B

Analysis of Covariance: School Achievement Factor
Initial Variable: IQ (Stanford-Binet)
Source of Variation: Grade Level

Source of Variation	df	Adjusted SS	MS	F Ratio	Group	Mean	Adjusted Mean
Between groups	2	148.93	74.46	8.28**	Grd. 4	52.60	52.31
Within groups	52	467.61	8.99		Grd. 5	55.00	54.91
Total	54	616.53			Grd. 6	56.20	56.51

** ($p < .01$)

TABLE 3-A

Stepwise Multiple Regression Analysis
Dependent Variable: Mean Academic Achievement Grade (CAT)

Step Number	Variable Entering	F Level	R	Proportion of Variance: All Entering Variables	Proportion of Variance: Entering Variable Only
1	Achievement Anxiety (Questionnaire Factor IV)	37.4**	.64	41.0%	41.0%
2	WISC Vocabulary	7.5**	.69	47.6%	6.6%
3	Stanford-Binet IQ	4.0*	.72	51.8%	4.2%

* ($p < .05$)
** ($p < .01$)

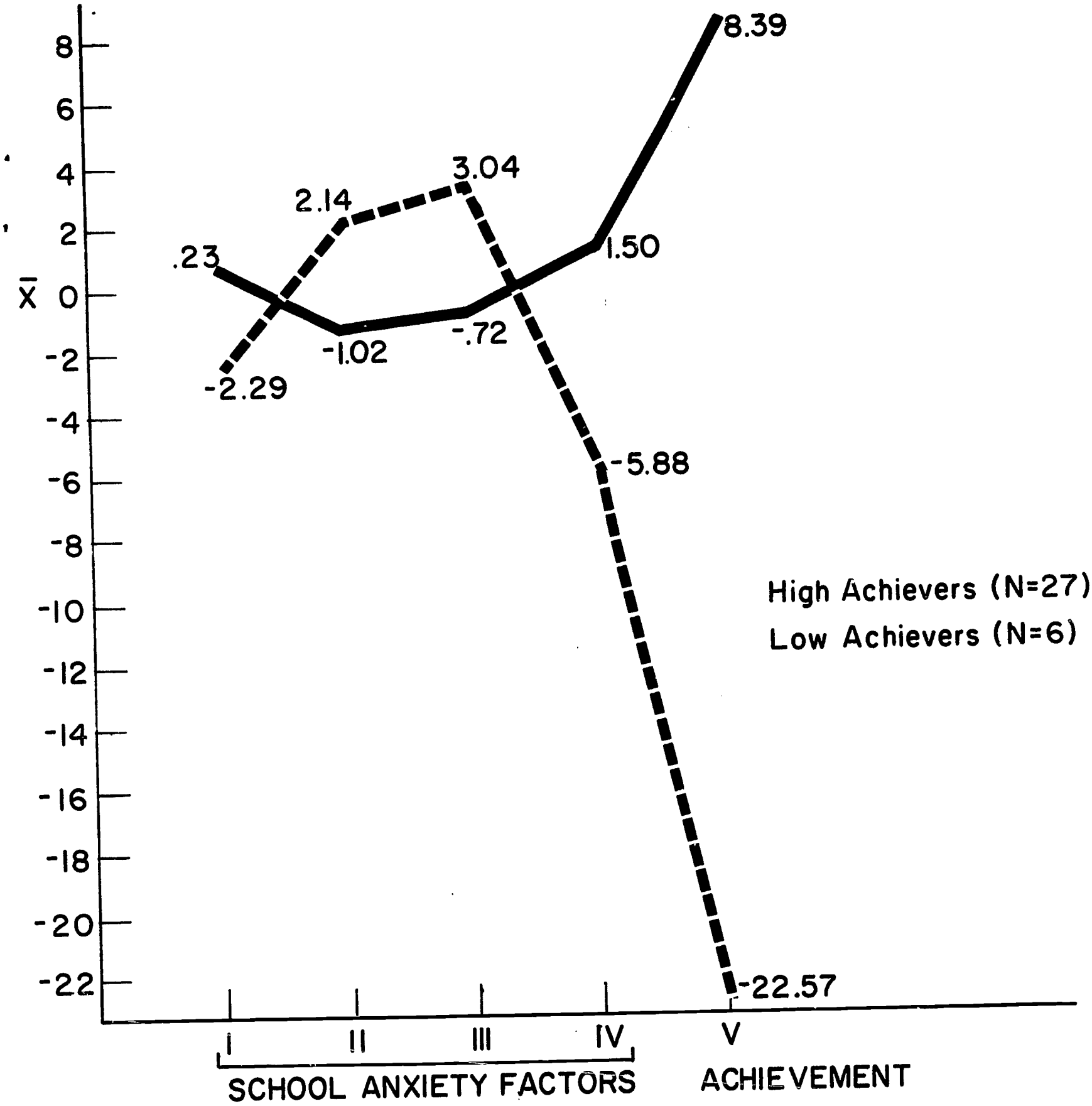
TABLE 3-B

Stepwise Multiple Regression Analysis
Dependent Variable: Mean Academic Achievement Quotient (CAT)

Step Number	Variable Entering	F Level	R	Proportion of Variance: All Entering Variables	Proportion of Variance: Entering Variable Only
1	Stanford-Binet IQ	62.6**	.73	53.1%	53.1%
2	Achievement Anxiety (Questionnaire Factor IV)	6.29*	.77	59.3%	6.2%

* ($p < .05$)
** ($p \leq .01$)

TABLE IV: TREATMENT EFFECTS FOR TWO CLUSTERS: HIGH ACHIEVERS/LOW ACHIEVERS



I Anxiety: Test Anticipation (t= 1.82)

II Anxiety: Teacher Reports to Parents (t= -3.01**)

III Anxiety: School Failure (t= -3.39**)

IV Anxiety: School Achievement (t= 5.72***)

V Achievement: C.A.T. Mean Grade Placement (t= 9.29***)

* $p < .05$

** $p < .01$

*** $p < .001$